

## درس پردازش تصویر

### تمرین ۱:

به کمک نرم افزار متلب، نتایج بدست آمده در مثال‌های زیر را که از فصل سوم کتاب درس، انتخاب شده اند، بدست آورید.  
پاسخ تمرین بایستی به صورت یک فایل ورد شامل تصاویر نتایج بدست آمده به همراه کد برنامه‌های متلب نوشته شده، باشد.

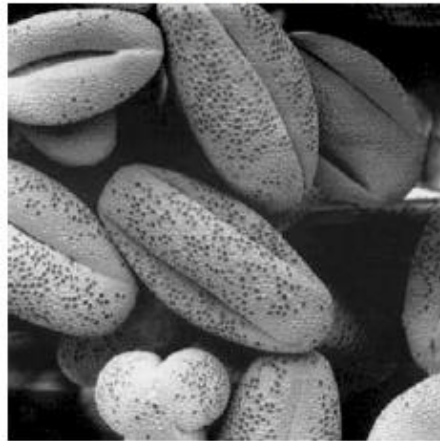
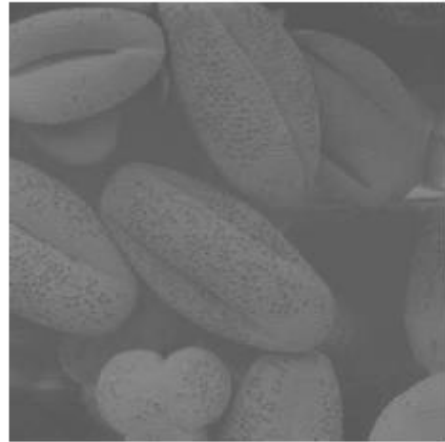
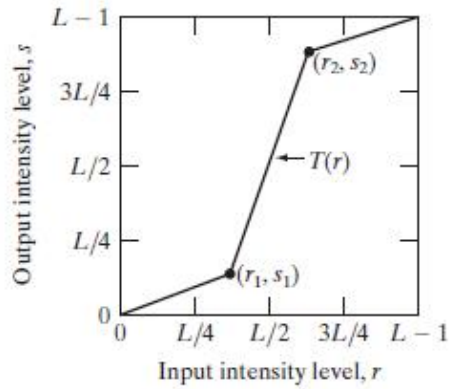
a b  
c d

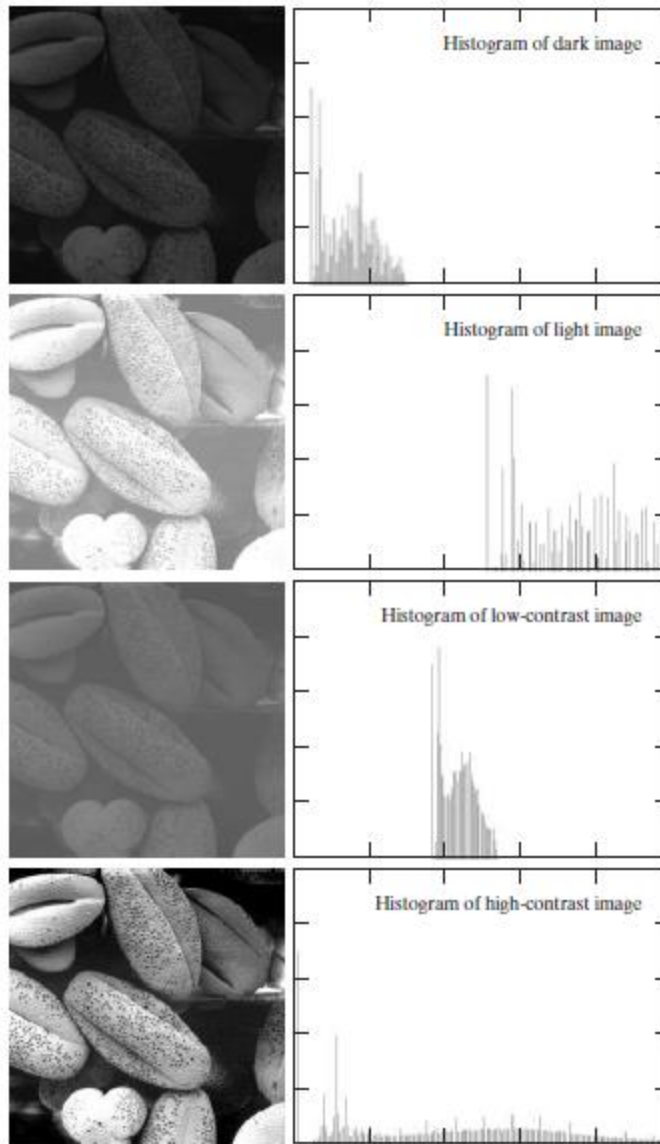
**FIGURE 3.9**  
(a) Aerial image.  
(b)–(d) Results of applying the transformation in Eq. (3.2-3) with  $c = 1$  and  $\gamma = 3.0, 4.0,$  and  $5.0,$  respectively. (Original image for this example courtesy of NASA.)



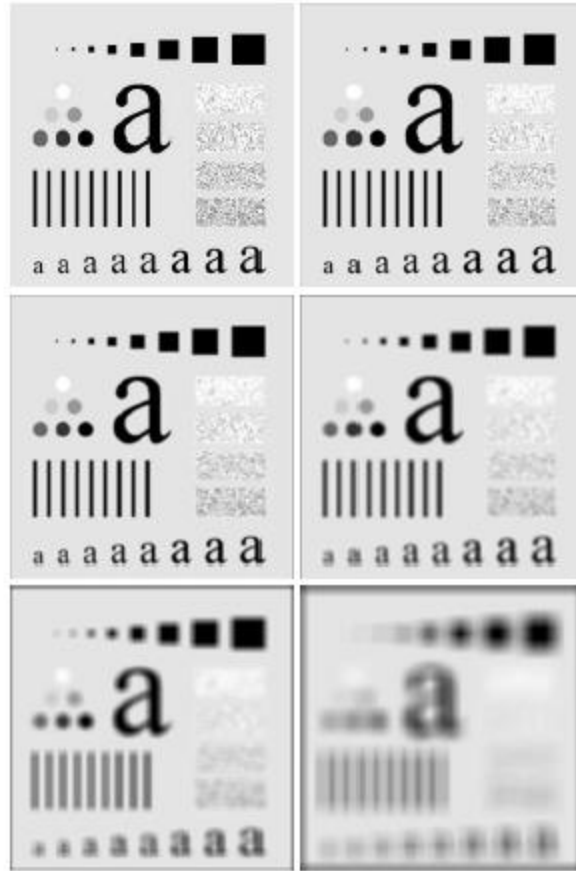
a b  
c d

**FIGURE 3.10**  
Contrast stretching.  
(a) Form of transformation function. (b) A low-contrast image. (c) Result of contrast stretching. (d) Result of thresholding. (Original image courtesy of Dr. Roger Heady, Research School of Biological Sciences, Australian National University, Canberra, Australia.)



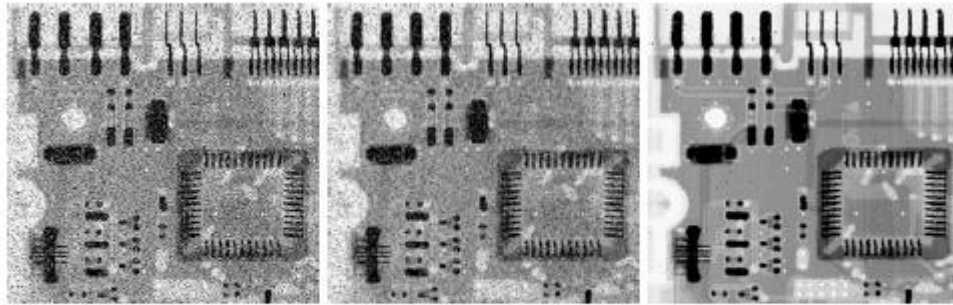


**FIGURE 3.16** Four basic image types: dark, light, low contrast, high contrast, and their corresponding histograms.



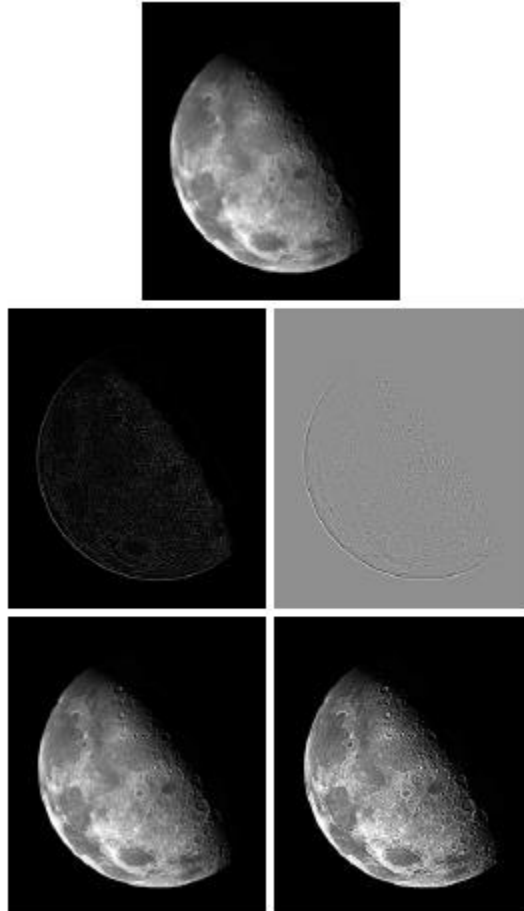
**FIGURE 3.33** (a) Original image, of size  $500 \times 500$  pixels. (b)–(f) Results of smoothing with square averaging filter masks of sizes  $m = 3, 5, 9, 15,$  and  $35,$  respectively. The black squares at the top are of sizes 3, 5, 9, 15, 25, 35, 45, and 55 pixels, respectively; their borders are 25 pixels apart. The letters at the bottom range in size from 10 to 24 points, in increments of 2 points; the large letter at the top is 60 points. The vertical bars are 5 pixels wide and 100 pixels high; their separation is 20 pixels. The diameter of the circles is 25 pixels, and their borders are 15 pixels apart; their intensity levels range from 0% to 100% black in increments of 20%. The background of the image is 10% black. The noisy rectangles are of size  $50 \times 120$  pixels.

a b  
c d  
e f



a b c

**FIGURE 3.35** (a) X-ray image of circuit board corrupted by salt-and-pepper noise. (b) Noise reduction with a  $3 \times 3$  averaging mask. (c) Noise reduction with a  $3 \times 3$  median filter. (Original image courtesy of Mr. Joseph E. Pascente, Lixi, Inc.)



a  
b c  
d e

**FIGURE 3.38**  
 (a) Blurred image of the North Pole of the moon.  
 (b) Laplacian without scaling.  
 (c) Laplacian with scaling.  
 (d) Image sharpened using the mask in Fig. 3.37(a).  
 (e) Result of using the mask in Fig. 3.37(b).  
 (Original image courtesy of NASA.)